

## REMARKS

This response is submitted in an earnest effort to bring this application to issue without delay.

Applicants wish to thank Examiner Helm for withdrawing the finality of the rejection in the office action mailed 5 August 2009 and issuing a new office action on 29 September 2009 in which the Examiner maintained the same grounds of rejection as set forth on 5 August 2009, but in which the rejection is not a final rejection.

The Examiner has rejected claims 25, 26, 35 and 36 under 35 USC 103 as obvious again citing FINBERG in combination with HALLORAN et al. However, in order to show that one skilled in the art would be motivated to form two interpenetrating polymer networks that include the PMS disclosed in FINBERG with the PMSQ disclosed in HALLORAN et al, the Examiner has cited two new references: US Patent 5,115,020 to MURAMOTO et al and PRODUCT BROCHURE KSP Series HYBRID SILICONE POWDERS FOR PERSONAL CARE from SHIN-ETSU, hereinafter KSP. The Examiner maintains her position that FINBERG discloses interpenetrating polymer networks wherein one polymer is PMS and the second polymer may be any polymer at all. She maintains that HALLORAN et al discloses interpenetrating polymer networks containing PMSQ and a second polymer that may be a substituted vinyl copolymer. The Examiner now argues that MURAMOTO discloses particles of semi- and fully interpenetrating polymer

networks composed of two polymers that are not cross-linked to one another, that these particles are prepared by emulsion polymerization, and that these particles are envisioned for cosmetic use. The Examiner further argues that the KSP reference discloses spherical silicone powders that are composed of two silicone based polymers, namely, PMS and PMSQ. The particle size is taught to be between 2 and 10  $\mu\text{m}$ , for two specific available varieties. In addition the compositions are taught to be useful in cosmetic compositions to impart a soft, silky feel to cosmetic compositions.

The Examiner concludes that HALLORAN et al, MURAMOTO et al and KSP all provide motivation to one "skilled in the art" to select PMSQ as the second polymer in the FINBERG interpenetrating polymer network compositions to obtain a cosmetic composition. The Examiner believes that there are only a limited number of ways to combine PMS and PMSQ into a single particle, one of which being an interpenetrating polymer network, and so it would be obvious that the presently claimed hybrid silicone composite powder having a particle size of 2 to 10  $\mu\text{m}$  would be useful as an ingredient for preparing cosmetics used on the skin to impart a smooth silky feeling, and that it would be obvious to prepare the presently claimed hybrid silicone composite powder using emulsion polymerization, in view of the disclosure in FINBERG that suspension polymerization may be used to prepare interpenetrating polymer networks. Even though there is no disclosure in FINBERG of

preparing a composition containing an interpenetrating polymer network used as a cosmetic, the Examiner argues that FINBERG contemplates that the compositions disclosed therein will come into contact with human tissue when in use and refers to page 6, lines 46 to 49 of FINBERG.

The Examiner recognizes that Applicants use emulsion polymerization, and not suspension polymerization to prepare their hybrid silicone composite powder of PMS and PMSQ interpenetrating polymer networks having a particle size of 2 to 10  $\mu\text{m}$ , and also recognizes Applicants' previous assertions that emulsion polymerization is not the equivalent of suspension polymerization because but argues that both suspension polymerization and emulsion polymerization are equivalent ways to prepare the spherical particles of interpenetrating polymer networks of a particle size between 2 and 10  $\mu\text{m}$ . The Examiner argues that suspension polymerization may be carried out using non-aqueous solvents as well as aqueous solvents, so that hydrolysis of one of the reactants by the aqueous solvent is not necessarily a problem, and has cited ZHU for its disclosure of using non-aqueous solvents in suspension polymerization. The Examiner also argues that suspension polymerization is capable of producing particles of a size between 2 and 10  $\mu\text{m}$  in diameter and has cited BLONDEAU et al in support thereof where ultrasound is used to generate the

suspension. The Examiner further argues that because MURAMOTO et al discloses emulsion polymerization as a way to also produce particles of a size between 2 and 10  $\mu\text{m}$ , it is obvious that either the suspension polymerization of FINBERG or the emulsion polymerization of the present process would be expected to produce the presently claimed hybrid silicone composite powder having a particle size of 2 to 10  $\mu\text{m}$ .

Applicant James Wang will first express his direct comments regarding the Examiner's rejection of the claims. I feel that it is very unfortunate that the Examiner has not recognized the novelty and the inventiveness of our presented claimed hybrid silicone composite polymer. I believe that she should accept the differentiation of the chemical structure, the molecular structure as well as the physical functions of our IPN material and those of the other IPN materials disclosed in the cited prior art references. The Examiner's view of the cited combination of prior art references with respect to the presently claimed invention is apparently as follows:

- (1) IPN materials of PMS with other polymers were taught by prior art. Therefore, our invented IPN of PMS with PMSQ is obvious.

- (2) Preparation of spherical particle by suspension polymerization was taught. The emulsion polymerization process used in the present invention is not necessary.
- (3) KPS-100 comprising PMSQ and PMS in single particle exists at the time of the present invention. The use of PMSQ and PMS to make IPN is obvious.

I disagree with the Examiner on the above three points and provide the following explanation aside from those presented before.

Point (1)

Our invention is a new IPN spherical powder of PMS and PMSQ in a single particle sizing from 2-10 microns. Since we filed the patent in 2004, we have started manufacturing over 10 tons a year under the trade name of Gransil EPSQ for global cosmetic industries.

Gransil EPSQ is the first and only IPN spherical particle material in the world up to present. Its new structure and super high oil thickening property have been widely recognized and utilized in cosmetic products since 2004.

Some other cosmetic manufactures have filed application patents that claim new cosmetic product compositions containing Gransil EPSQ. For example, Revlon has applied, on May 3, 2004 (two months

after our filing date), a patent of cosmetic compositions with Gransil EPSQ. The title is "Cosmetic Compositions with Interpenetrating Polymer Network", Pub. No.2005/0244351A1.

In their patent application, they claim that Gransil EPSQ provides certain desirable properties of elastomers, as well as improved compatibility with cosmetic oils, higher oil absorption capacity, and other beneficial properties (paragraph 004).

We all know that there would be unlimited number of, if not at least tens of dozens, various IPNs of PMS in combination with one or more other polymers to be discovered even though one has prepared some in earlier work. No one really knows how many more and what new properties will be discovered between now and the future.

All the earlier prior art references cited by the Examiner were not related to or intended to be teaching an IPN spherical particle of PMS and PMSQ for cosmetic applications. It is too ham-handed to proclaim that all possible IPNs of PMS-based have already been taught and are therefore obvious regardless of the second component, molecular structure, topology structure, chain configuration, particle size, particle shape and so forth..

At the time of our invention, no one knew what an IPN spherical

particle of PMS and PMSQ would be look like and what properties it may have until our invention.

So far, the Examiner has not shown us a single patent or literature reference or combination of references that discloses or suggests an IPN powder of our present invention. What she has found are references that cover other art areas with a broad IPN concept as taught in textbooks without intention to pursue the research and to teach any possible processes and examples which relate to our present invention. In the latest action, she cited a few patents as prior art references. There is a big gap between those prior art references and our present invention.

US Patent 5,115,020 by Muramoto et al disclose a semi-IPN particle material in which a liner, non-crosslinked polymer is imbedded in a crosslinked polymer network. Such a semi-IPN particle differs from IPN spherical particle of our invention because the linear polymer imbedded in semi-IPN particle is not permanently locked within the network and can consequently be extracted out when mixed in a solvent as in the case of cosmetic formulations.

This patent doesn't teach the IPN material of our invention for the reasons below:

The IPN particle under claim comprises different chemical components, i.e., it has different chemical structure. What it taught with respect to our invention has no more reference value than a textbook.

The IPN particle in MURAMOTO et al is not spherical. According to Example 6, the inventors had to add potassium chloride to effect aggregation to be able to separate from water. Muramoto et al didn't even mention that their method was intended to make well-defined SPHERICAL particles. Non-spherical particles are rough on skin so they are not generally accepted for cosmetic products, and therefore they have little use value for cosmetic. To make a spherical particle, the polymerizable oil droplets must not experience aggregation throughout the process.

Muramoto et al's method is very limited to some polymers and monomers that must satisfy the definition for component A and B.

The two components in our IPN materials, PMS and PMSQ, don't fall within the definition of Component A and B.

Component A must have dispersive power and crosslinking property. PMS doesn't fall within the definition of Component A because it has no dispersive power, i.e., "the capacity of maintain the resin in water or an aqueous medium containing a water miscible organic



solvent in a stabilized dispersion form at the molecular or molecular aggregate level the dispersive power shall denote the hydrophilic group (nonionic, ionic or amphoteric function group) required for maintaining the resin in an aqueous medium in a stabilized dispersion form. (see column 2, line 42-53). PMS doesn't have hydrophilic groups such as hydroxy- carboxy-, amino-group, and therefore has no dispersive power. Examples 1-7 shows Component A is maleinized polybutadiene-hydroxyethyl methacrylate (Example 1), polyoxyethylene dimethacrylate (Example 2), hydroxyethyl methacrylate-pyromellitic acid copolymer (Example 3). All these polymers HAVE hydrophilic groups of hydroxy- or carboxylic-acid group and vinyl double bonds for crosslinking.

PMS doesn't fit this polymer category.

Component B must be non-crosslinking thermoplastic resin.

PMSQ doesn't fall within the definition of Component B because it is not a non-crosslinking polymer, nor is it a thermoplastic resin, but a thermosetting resin, i.e., it is not soluble in a solvent due to crosslinking structure.

The relevance of Muramoto et al's particle composition and the

preparation method to our IPN composition and the preparation method is obviously negligible.

The Examiner writes, on page 5, " The combination of PMS and PMSQ in a single spherical particles between 2 and 10 microns, intended for cosmetic use, and known for the smooth skin feel it conferred was known at the time of the invention."

This is not true because at the time of our invention, KSP-100 was known to be a spherical particle of chemically bonded PMS and PMSQ. It has a core-shell molecular structure with PMS being the core and PMSQ the shell (See KSP-100 brochure, page 3).

However, no IPN structured material of single spherical particle was known, neither was its properties known. After we engineered IPN spherical particle using PMS and PMSQ, we surprisingly discovered that our IPN material is a completely different material from KSP-100 despite that they are made from the same components.

None of references found by the Examiner has described IPN spherical particle of PMS and PMSQ and demonstrated at least one Example of it. Furthermore, none of them has described or even acknowledged that the thickening power of PMS elastomer is

increased by a thousand times when IPN structure is engineered with PMSQ.

Nothing has been known about IPN structured spherical particle of PMS and PMSQ in terms of its physical properties, chemical compatibility, appearance and material functions. From a technology point of view, EPSQ represents a new discovery in material science because such a material didn't exist until we invented it, and no one even knew its surprising new properties.

The Examiner further writes " Since an interpenetrating network is one of limited number of ways to combine two polymers in a single particle, PMS and PMSQ were known to be combined in a single particle and each was known in interpenetrating networks, it would have been obvious to one of ordinary skill in the art at time of the invention to select PMSQ as the second polymer in the invention of Finberg and size them between 2 and 10 microns".

I strongly disagree with this argument. No one really knows how many more new materials made out of PMS and another component, including PMSQ, can be further discovered from this point forward. I have indicated already earlier that there would be many chemical ways to combine PMS with another component to make a new material. Just take PMS and PMSQ as an example and some of the many possibilities include the following:

- 1.. Nano-size particle of combination of PMSQ and PMS,
- 2.. PMSQ as core while PMS as shell, spherical 2-10 microns (reversing KSP-100 configuration structure),
- 3.. Core (PMSQ)-Shell(PMS)-Shell (PMSQ), 2-10 microns
- 4.. Varying the ratio of PMS to PMSQ for core-shell, and core-shell (1)-shell (2) particles
- 5.. Core (IPN of PMS and PMSQ) -Shell (PMSQ), 2-10 microns;
- 6.. Reverse (5);
- 7.. Varying the ratio of PMS and PMSQ;
- 8.. Plate (not spherical) particles of Core (PMSQ)-shell (PMS), 2-30 microns;
- 9.. Irregular shape particles of PMS and PMSQ for increasing the friction for exfoliation of skin.

I can go on and on. A chemist can employ all existing chemistry and knowledge from scientific community to research and discover new materials. There would be tons of detailed research work to materialize all above structures and find the possible way to carry meaningful process. How can one say that all these new materials will not be new and are obvious to one skilled in the art? If this holds true, I don't know what a material scientist can patent.

The choice of PMSQ as the second polymer to make IPN spherical particle is one of choices among many polymers such as silica, PMMA, nylon, urethane, polyethylene, polystyrene, polyisobutene, etc. All of these polymers are popular in the cosmetic industry and we could have engineered new IPNs by combining any one or two or even three of them with PMS.

We are never at the end of discovery of science and technology, and can never claim that combinations of PMS and PMSQ are all known and done.

Finberg's process is related a molding process of bulk polymerization of silicone rubber and a vinyl monomer. The invented material is a silicone rubber with improved breaking strength, elongation break and hardness as compared to a blend of silicone rubber with vinyl polymer. The resulting material is a big piece of rubber in the mold and the composition has one crosslinking network and one non-crosslinked vinyl polymer as a plasticizer in the molded goods. This patent is by no means teaching how to make IPN material for cosmetic, nor had he such an intention. If we replace the vinyl polymer with PMSQ in his process, the reactions would by no means lead to particle materials.

IPNs have unlimited number of ways to combine two or more polymers in a network, and the topology of IPNs was invented again and again

as patent literature revealed since the first IPN patent in 1914. Below is the data from Polymer Blends Handbook Vol 1. Page. 418.

Table 1. Early IPN Patents

Polymer 1	Polymer 2	Application	Inventor	Pat. No.
Phenol-formaldehyde	Natural rubber	Toughen phonograph records	J.W. Aylsworth	US Pat. 1,111,284 1914
Natural rubber	PVC	Plastic material	H. Hopff	Ger. Pat. 623,351 1935
Poly (methyl methacrylate)	Poly (methyl methacrylate)	Smooth surfaced plastics	J.J.P. Staudinger	US Pat. 2,539,377 1951
Positively Charged network	Negatively charged network	Ion exchange resin	G.S. Solt	Br. Pat. 728,508 1955

As can be seen, Finberg's invention is only one of the continued inventions of IPNs, so is our present invention.

If we continue fill the table above, we have:

Table 2. IPN Patents

Polymer 1	Polymer 2	Application	Inventor	Pat. No.
Silicone rubber	Vinyl polymer	Elongation break, hardness, break strength for molded rubber goods	J.W. Aylsworth	US Pat. 1,111,284 1914
Silicone rubber	PMSQ	Oil thickening and gelling agent, oil absorption, smooth feel for cosmetics		<b>No Patent is known.</b>

What rational conclusion we can reach here? No patent is known with relation to our present invention.

The fact is that our IPN material of present invention has not been available until the present invention.

Point (2)

The Examiner keeps citing more publications each time to prove that people have used suspension polymerization to make spherical particles.

We all know that some spherical particles can be made by suspension polymerization at the research level, not at the industrial level for certain polymers or monomers. But for certain other monomers, emulsion polymerization can be the only choice due to their compatibility, dispersibility and emulsification ability.

In our emulsion polymerization process, we can produce over 60% solids of desired spherical particles. If we change it to suspension polymerization, it is impossible to make such spherical particles at such high solids because the particles would aggregate into polymer resin lumps. Theoretically, we can always suspend very low percent solids, say 1-10% monomer, in water with super high shear mixing, and make some spherical particles. Such a process is not practical and not useful for industrial production. The huge costs of energy, labor, time and quality will not be recovered by produced product. In this sense, an efficient, practical, economical emulsion process is superior to suspension polymerization for our IPN material.

The emulsion polymerization process to make the IPN of our present invention is superior by far to a suspension polymerization, if possible, in terms of energy cost, yield and product quality and production volume. From industry point of view, the suspension polymerization process for 2-10 micron spherical particles is not controllable even at very low solids reaction and high shear



mixing. The disadvantages of suspension polymerization are so obvious compared to emulsion polymerization for the preparation of present IPN spherical particle.

The Examiner believes that our IPN can be made with suspension polymerization. The thing is that any polymerization method, theoretically, can be used to make particles at very low concentrations in a research lab if there are no concerns about the yield, energy cost, productivity, quality control, scale-up ability, equipment requirements, etc. If a process is only good for lab-scale research, it is not viewed as practical process for industrial production. To industries, it is the difference between life and death. What we claimed is our emulsion process is a practical, industrial process with many advantages over other possible processes including suspension polymerization, solution polymerization and bulk polymerization.

Point (3)

The fact is that our IPN material of the present invention has not been available until the present invention.

KSP-100 is a spherical silicone powder with surface being treated by PSQ through chemical bonding. After surface treatment, the

silicone powder has less agglomeration and is easy to disperse, but its oil absorption and swelling are shattered.

Gransil EPSQ is the trade name of our present invention, which has no chemical bonding between PSQ and silicone powder. Its molecular structure is IPN type (not only on surface) of spherical powder. This powder is more elastic, sponge, and its oil absorption and swelling are even significantly increased after being engineered IPN structure. We have shown the comparison data to the Examiner before in my first Declaration Under 37 CFR 1.132.

While both KSP-100 and Gransil EPSQ share the same components in the structure, they are totally different material with different characters and physical properties.

KSP-100, INCI name: Vinylmethicone/methiconesilsesquioxane  
Crosspolymer

It appears like individual solid sphere beads, feels slip and solid, and has very weak oil absorption.

Gransil EPSQ, INCI name:  
Dimethicone/Divinylmethicone/Silsesquioxane Crosspolymer

It appears like sponge powder cake, feels soft and elastic and has

super high oil absorption and thickening power.

KSP-100 has a core-shell structure, i.e., PMS being the core and PMSQ the shell. The core is made first, and then surface is further modified with PMSQ via chemical bonding. Consequently, PMS elastic core is wrapped with plastic PMSQ shell, resulting in higher slip feel (more like PMSQ particle feel) and ease of dispersing in oil, but significantly reduced oil absorption. The advantage of ease of dispersing was achieved at huge expense of oil absorption and thickening capacity.

On the other hand, Gransil EPSQ has a loose IPN structure (not core-shell structure), i.e., PMS and PMSQ are intertwined into network throughout the particle. Its network is more elastic and random due to the interruption of another different kind of molecular chain segment and therefore its pore size and void distribution are more favorable for oil absorption and swelling.

Compared to KSP-100 particle, Gransil EPSQ has demonstrated 6000 times oil thickening efficiency. See formula 1 and 2 in Table 2 in my second Declaration Under 37 CFR 1.132.

Compared to PMS particle, Gransil EPSQ has demonstrated 1000 times more oil thickening efficiency. See formula 2 and 3 in Table 2 of

my second Declaration Under 37 CFR 1.132.

Compared to PMS and PMSQ, KSP-100's thickening efficiency is between PMS and PMSQ, and closer to PMSQ side. See formula 1, 3 and 4 in Table 2 of my second Declaration Under 37 CFR 1.132.

Compared to the physical blend of PMS and PMSQ, Gransil EPSQ has demonstrated 2770 times oil thickening efficiency. See formula 2 and 5 in Table 2 in my second Declaration Under 37 CFR 1.132.

My conclusions are as follows: KSP-100 is a chemically bonded hybrid spherical particle. Its properties are closer to the PMSQ side. Its major function is similar to PMSQ as slip aid, anti-caking and a Gransil EPSQ of present invention is non-chemically bonded IPN hybrid spherical particle. Its properties are close to the PMS side, but drastically surpass PMS in oil absorption and thickening power. Its major function is as oil absorption and thickening agent to make gels delivering soft and smooth feel.

KSP-100 and Gransil EPSQ are not interchangeable with each other because they are different materials and have different functions. Their difference in molecular structure is responsible for their different physical properties and functions.

In addition to the direct comments provided by Dr. James Wang, Applicants maintain that the Examiner should also consider the following:

Applicants do not agree that the combination of prior art references applied by the Examiner renders any of the claims obvious under 35 USC 103. Applicants hold to their position, set forth on page 6, last paragraph through page 8 at the middle of the page of their response filed 9 July 2009, that FINBERG is a "broadcast" or "shotgun" disclosure that discloses compositions that contain PMS as an interpenetrating polymer along with a second polymer, but that definition of the second polymer is so broad, so open-ended, that it would not point one "skilled in the art" in the direction of a polymer such as PMSQ. The fact that FINBERG is silent as to any utility for the compositions disclosed therein as cosmetic ingredients further underscores the Applicants' argument that the reference is a "broadcast" or "shotgun" disclosure. Applicants note the Examiner's statement at the end of the first paragraph on page 4 of the office action, stating that FINBERG contemplates on page 6, lines 46 to 49 that the compositions therein will come into contact with human tissue. The reference goes on to state, however, that in such a case, amino acids and polar groups should be included in the second polymer network. Neither of these

groups is incorporated in the Applicants' PMSQ. Furthermore just because the FINBERG composition may contact human tissue does not at all mean or even suggest that the FINBERG compositions would be useful as ingredients for cosmetics. See page 3, lines 15 and 16 of FINBERG. Once again a contact lense comes into contact with ocular tissue, but that does not mean that the contact lense has anything to do with cosmetics and in particular to a cosmetic additive to impart a smooth feeling when the cosmetic is applied to the skin. While FINBERG mentions a "fine dispersion of particles" on page 6, line 23, there is no indication or even a suggestion that those particles would be a microspherical powder in the 2 to 10  $\mu\text{m}$  particle size range. Furthermore the ultimate use of the FINBERG PMS particles forming an interpenetrating polymer network is far removed from the Applicants' microspherical particles to impart a smooth feeling to the skin in cosmetics. The FINBERG interpenetrating polymer network containing PMS is used to form sheets of silicone rubber having improved breaking strength, elongation break and hardness.

Applicants also hold to their position concerning the HALLORAN et al reference as set forth on page 9, last paragraph through page 11, line 5 of their response filed 9 July 2009. Once again the second polymer disclosed in HALLORAN et al, that is the polymer used in addition to PMSQ is not disclosed as PMS or any polymer containing silicon, let alone a silicone polymer structurally

similar to PMS. Furthermore the only polymer disclosed in HALLORAN et al that forms an interpenetrating polymer network is PMSQ. The second polymer disclosed in HALLORAN et al is not an interpenetrating polymer network, but a simple copolymer such as PVP/PA which is soluble in water or in an alcohol and which will not form a polymer network per se, either before or after application. Once again HALLORAN et al discloses a hair fixative and not a composition that is even remotely similar to the Applicants' presently claimed compositions. Furthermore the HALLORAN et al reference contains no disclosure or suggestion of preparing a microfine spherical powder of IPN structure of any kind let alone an IPN structure comprising organosilicone (PMS) and silicone resin polysilsesquioxane (PMSQ).

Nor does combining MURAMOTO et al with FINBERG and HALLORAN et al render any of the present claims obvious. US Patent 5,115,020 to MURAMOTO et al discloses a semi-IPN particle material in which a liner, non-cross linked thermoplastic polymer resin (B) is imbedded in a cross linked polymer network (A). Such a semi-IPN particle differs structurally from IPN spherical particle of the presently claimed invention because the linear polymer imbedded in the semi-IPN particle is not permanently "locked" within the network and can consequently be extracted out when mixed in a solvent as in the case of cosmetic formulations. Examples of Component (A) in MURAMOTO et al include malenized polybutadiene-hydroxyethyl

methacrylate, polyoxyethylenedimethacrylate, and hydroxyethyl methacrylate-pyromellitic acid copolymer, all of which are hydrophilic and do not have structure or properties in common with PMS. Component (B) of MURAMOTO et al includes only non-cross-linked thermoplastic resins. Applicants' PMSQ is a cross-linked thermosetting resin and falls outside the scope of this reference. Furthermore MURAMOTO et al does not disclose spherical particles containing interpenetrating polymer networks of PMS and PMSQ. Non-spherical particles are rough on the skin so they are generally not accepted for cosmetic products, and therefore they have little value for cosmetic use. Applicants refer the Examiner to Example 6 of MURAMOTO et al which discloses that the particles are present in aggregated form and it is well known to those skilled in the art that aggregated particles do not have a spherical shape, and that the non-spherical particles may not be broken down into spherical particles later in the process.

Nor does combining the KSP reference with any or all of the preceding references provide a basis to reject any claim now presented as obvious under 35 USC 103. The hybrid silicone composite powders disclosed in KSP, such as KSP-100, a spherical silicone powder with surface being treated by PSQ through chemical bonding. After surface treatment, the silicone powder has less agglomeration and is easy to disperse, but its oil absorption and swelling are shattered. Furthermore KSP-100 has a



core-shell structure, where PMS is the core and PMSQ the shell. The core is made first, and then surface is further modified with PMSQ via chemical bonding. Consequently, the PMS elastic core is wrapped with the plastic PMSQ shell, resulting in higher slip feel (more like PMSQ particle feel) and ease of dispersing in oil, but with a significantly reduced oil absorption. The advantage of ease of dispersing was achieved at huge expense of oil absorption and thickening capacity.

On the contrary the presently claimed PMS/PMSQ interpenetrating polymer network particles according to the present invention have a loose interpenetrating polymer network structure and not a core-shell structure. In the presently claimed composition the PMS and the PMSQ are intertwined to form interpenetrating polymer networks throughout the particle. The particles produced according to the present invention are more elastic and as a result the pore size and void distributions are more favorable for oil absorption and swelling. Therefore in terms of both the particle structures and the properties of the particles, the particles of the presently claimed invention are highly distinguishable from those of the KSP reference, notwithstanding that the KSP reference does disclose particles containing both PMS and PMSQ, but not as interpenetrating polymer networks. Thus the combination of these four prior art references falls far short of providing a sufficient basis for rejecting any

of the claims now presented as obvious under 35 USC 103.

Applicants believe that there are actually three independent reasons why the cited combination of prior art references falls short of providing a sufficient basis to reject any claim now presented as obvious under 35 USC 103. The first reason is the novel and unobvious structure of the hybrid silicone composite powder, where the powder has a spherical shape with a particle size ranging from 2 to 10  $\mu\text{m}$  and where the powder is formed of two interpenetrating polymer networks of PMS and PMSQ. For the reasons set forth herein above, the structure of the Applicants' composite powder is both novel and unobvious. The combination of FINBERG with HALLORAN et al, MURAMOTO et al and KSP falls short because of the "broadcast" or "shotgun" nature of FINBERG in terms of the second polymer to be employed together with PMS, and the fact the then HALLORAN et al reference does not disclose or suggest a polymer in addition to PMSQ that in any way resembles PMS, nor does the reference disclose the production of microparticles. The fact that the FINBERG reference discloses that the compositions therein are used to make contact lense material and the HALLORAN et al compositions are used as hair fixatives further distances each of these references from the other and from the presently claimed invention. The MURAMOTO et al reference discloses particles of a completely different structure from that of the present invention, both in terms of the polymers employed and the kind of bonding that

holds the polymers together to form the spherical particles. The KSP reference discloses the combination of PMS and PMSQ but not as interpenetrating polymer networks held together without chemical bonding. There are no interpenetrating polymer networks disclosed in KSP at all and furthermore the PMS core is chemically bonded to the PMSQ shell. Thus one again for structural reason alone the combination of cited references does not suggest the presently claimed invention.

Applicants strongly disagree with the Examiner's assertion on page 6, first paragraph of the office action when she states: "Since an interpenetrating polymer network is one of a limited number of ways to combine two polymers in a single particle, PMS and PMSQ were known to be combined in a single particle, and each was known in interpenetrating polymer networks, it would have been obvious to one of ordinary skill in the art at the time of the invention to select PMSQ as the second polymer in the invention of FINBERG and size them between 2 and 10 microns." In fact there are many ways in which PMS and PMSQ may be combined in a single composition, depending on the chemical bonding chosen to link the two polymers and depending whether none, one or two kinds of interpenetrating polymer networks are formed. The KSP reference is only one particular case where there is chemical bonding between the PMS and PMSQ and no interpenetrating polymer networks have formed. Applicants have discovered an additional way to bond the

polymer networks to one another solely by a physical bond by forming interpenetrating polymer networks of both PMS and PMSQ where there is no chemical bond between the two polymers. In addition Dr. James Wang has discussed herein above, several alternative possibilities for preparing compositions containing both PMS and PMSQ in addition to the presently claimed compositions and he has indicated that the list is open-ended.

Not only have the Applicants discovered novel and unobvious compositions for all of the structural bases for distinction as discussed herein above, but furthermore Applicants have discovered that their new compositions have surprising and unobvious properties not at all suggested by the combination of the FINBERG, HALLORAN et al, MURAMOTO et al and KSP references. Applicants have obtained directly comparative data between the presently claimed hybrid silicone composite powder containing the PMS and PMSQ interpenetrating polymer networks held together by physical bond solely and the hybrid silicone powders of KSP, in particular KSP-100, in which a PMS core is chemically bonded to a PMSQ shell. The results in terms of the viscosity of each, where the respective compositions are dissolved in cyclopentasiloxane fluid (DC 245). The difference in terms of the viscosity is both striking and unexpected. Applicant Dr. James Wang has prepared and executed a second Declaration Under 37 CFR 1.132, and that declaration accompanies this response. The Examiner's attention is directed to

the Table appearing on page 5 of the declaration where Formula 1 shows the viscosity for KSP-100 and Formula 2 shows the viscosity for Gransil EPSQ. The viscosity for the KSP-100 is 90 cPs and the viscosity for the Gransil EPSQ is 568,0000 cPs. Note that Applicants have already provided the same data for the Gransil EPSQ in the first declaration Under 37 CFR 1.132 submitted by Dr. Wang on 6 January 2009.

Thus not only are the presently claimed hybrid silicone composite powders according to the invention structurally distinguishable from anything disclosed or suggested in the cited combination of prior art references, but furthermore the Applicants have demonstrated that the new hybrid silicone composite powders according to the present invention have vastly superior properties in terms of viscosity in a solution of cyclopentasiloxane fluid, and that such a vast difference in the viscosities was not at all expected. In view of the above Applicants believe that the claims now presented are patentably distinguishable over the cited combination of prior art references.

The second Declaration Under 37 CFR 1.132 also contains Dr. Wang's expert analysis of US Patent 5,115,020 to MURAMOTO et al in order to substantiate the arguments made in this response that distinguish the presently claimed hybrid silicone composite powder having particles with a spherical shape from the IPN particles

disclosed in MURAMOTO et al, which are not spherically shaped particles. See pages 8 and 9 of the second Declaration Under 37 CFR 1.132. Dr Wang has provided an explanation as to why the MURAMOTO et al particles are not spherical and has provided reasons why the presently claimed hybrid silicone composite powder has properties that are different from those of the MURAMOTO et al product. Dr. Wang will also provide further comments on the MURAMOTO et al reference later on in this response.

Furthermore there is yet a third reason why the presently claimed compositions are patentably distinguishable over the cited combination of prior art references. Applicants maintain that their method of preparing the hybrid silicone composite powder having a spherical shape with a particle diameter ranging from 2 to 10  $\mu\text{m}$  using the steps set forth in claims 37 through 42 is the only way to prepare the particles, and that it would not be obvious from the cited prior art, including FINBERG in combination with ZHU and BLONDEAU et al to prepare the presently claimed hybrid silicone composite powder. Applicants maintain that using emulsion polymerization, as opposed to suspension polymerization is the only practical way to prepare the powder on a large scale, outside the laboratory, that is to prepare a large volume of the powder using simple equipment. There is no disclosure or suggestion of same in the FINBERG reference.

FINBERG does not disclose a process which would enable the preparation of the presently claimed hybrid silicone composite powder having a particle size of 2 to 10  $\mu\text{m}$  and a spherical shape. The FINBERG process relates to a molding process of bulk polymerization of silicone rubber and a vinyl monomer. The invented material is a silicone rubber with improved breaking strength, elongation break and hardness as compared to a blend of silicone rubber with vinyl polymer. The resulting material is a big piece of rubber in the mold and the composition has one cross linking network and one non-crosslinked vinyl polymer as a plasticizer in the molded goods. This patent is by no means a teaching how to make IPN material for cosmetic, nor had FINBERG such an intention. Thus FINBERG per se provides no enablement for preparing the presently claimed hybrid silicone composite powder.

Combining FINBERG with ZHU and BLONDEAU et al to prepare the presently claimed hybrid silicone composite powder would still not enable one skilled in the art to prepare the presently claimed hybrid silicone composite powder. Dr. Wang's direct analysis of the BLONDEAU et al and ZHU references as applied by the Examiner to allegedly show the suspension polymerization may be used to prepare the hybrid silicone composite powder according to the invention having a particle size range of 2 to 10  $\mu\text{m}$  is as follows:

The BLONDEAU et al reference principally discusses ultrasound

suspension polymerization and employs the following steps:

1. Make suspension of about 10.6% monomers in water (See table 1);
2. Subject the suspension to ultrasound irradiation to disperse oil phase into droplets;
3. Stop the ultrasound irradiation and introduce a radical initiator to start polymerization for 8 hours;
4. Filter the particles and wash off PVP/PVA suspension agent and solvent; and
5. Vacuum dry the particles.

The results are as follows:

1. The particle size range is show in Fig 1. The particle size distribution is from 20-110 microns without ultrasound and from 1-100 microns with ultrasound.
2. Ultrasound can be used to make oil droplets smaller ranging from 1-10 microns in the suspension as shown in Fig. 2. Note that this curve is for oil droplet size prior to polymerization rather than the final particle size.
3. The particle shape becomes spherical (Fig.3) if the



ultrasound is turned off during polymerization, while non-spherical (Fig.4) if the ultrasound is turned on during polymerization. This is because ultrasound will distort the oil droplet shape.

4. PVP or PVA must be present at 1-3% of the total weight. When PVA at 0.1%, the particle size is centered at 100 microns (Fig. 5).

5. The oil droplet size in the suspension drifts roughly from 10 microns to 100 microns after 90 minutes (Fig. 8). As a result, the particles size is from 1 to 100 microns (Fig. 6).

If we take their method for our IPN particles, there would be some problems as below:

1. The suspension polymerization doesn't allow high load of monomers because monomer oil droplets tend to aggregate. Typically we load 67 -75% of monomers in the emulsion polymerization while Muramoto et al load only 10.6% of monomers in suspension.

2. Their suspension polymerization is very limited to a small volume of a few hundred grams and will not be working if a large volume, such as a few thousand kilograms, is required. The small oil droplets around the ultrasound head will quickly aggregate to big oil drops after drifting away from the ultrasound head that is

generally of 5 -10 cm in diameter.

3. Our requirements of particles size and shape cannot be met with their method. Our range is 2-10 microns, and their best results are 1-100 microns. There would be a lot of troubles to obtain spherical particles in their process.

4. The ratio of PVA to monomers is roughly 1/10, so resulting particles will contain 10% of PVA impurity if not washed off. In our process, the ratio of surfactant to monomers is roughly 0.1/10, so our product has only 1% surfactant and we can do direct drying without washing.

5. Their method cannot be scaled up to 4000 kg batch, while our emulsion polymerization can be scaled up to almost any kettle size. Our current batch size is around 4000 kg.

The ZHU reference discloses the following:

The ZHU reference describes the use of a perfluorocarbon fluid as a medium in the place of water in suspension polymerization for those monomers that are water sensitive or partially soluble in water and cannot be polymerized by conventional water suspension

polymerization.

Advantages:

1. It is an alternative way to carry out suspension polymerization of water sensitive or partially water soluble monomers such as methacrylic acid.

Disadvantages

1. Compared to water, a perfluorocarbon is too expensive as a suspension medium and very difficult to recover, and will cause pollution.

2. The use of fluorocarbon fluids is prohibited in many industries due to human being safety concern.

3. The most popular process of "reverse emulsion polymerization", i.e., water-in-oil, can work well for many of the monomers cited in this article and is really more economic and reliable than this method.

ZHU's experiments produced beads of random shape, not spherical particles and no particle size was discussed.

It is obvious that ZHU's method cannot be used to make our IPN spheres.

Thus combining the FINBERG reference with ZHU and BLONDEAU et al would still not enable the preparation of the presently claimed hybrid silicone composite powder having spherical particles and a particle size range of 2 to 10  $\mu\text{m}$ . If the prior art (i.e. FINBERG) does not disclose an enabling process to prepare the presently claimed hybrid silicone composite powder, then the presently claimed hybrid silicone composite powder is not anticipated by the prior art under 35 USC 102. If the combination of the prior art references (e.g. FINBERG, ZHU and BLONDEAU et al) does not enable or does not lead to a process that would enable preparation of the presently claimed hybrid silicone composite powder, then the presently claimed hybrid silicone composite powder cannot be considered obvious in view of the prior art under 35 USC 103. See Forest Laboratories Inc. V. Ivax Pharmaceuticals Inc., 84 USPQ 2d 1099 (CAFC 2007).

In addition to the matter of using suspension polymerization as disclosed in FINBERG, ZHU and BLONDEAU et al, as opposed to emulsion polymerization as employed by the Applicants in order to make the presently claimed hybrid silicone composite powder, there is an additional consideration. Not only do Applicants use emulsion polymerization, and not suspension polymerization, but

Applicants require a particular order of steps in their method to prepare the hybrid silicone composite powder, having an unexpectedly high viscosity when added to a solvent such as cyclopentasiloxane to form a gel, and if that particular order is not followed, then the result will not be the hybrid silicone composite powder according to the present invention, with a spherical shape and a particle size range of 2 to 10  $\mu\text{m}$ , and having the surprisingly high viscosity when added to a solvent such as cyclopentasiloxane, but instead will be a product with a much lower viscosity. Once again see the first Declaration Under 37 CFR 1.132 of Dr. Wang. Note that according to the method employed to prepare the presently claimed hybrid silicone composite powder the PMS network is first prepared using a hydrosilylation reaction in the presence of a catalyst and then a methyltrialkoxo silane is added to the PMS network under elevated temperature to promote the hydrolyzation-condensation of the methyltrialkoxo silane resulting in formation of an emulsion containing the interpenetrating polymer networks of both PMS and PMSQ. The emulsion is then diluted with water and spray dried to obtain the desired product.

Thus there is no indication or suggestion in the FINBERG, ZHU and BLONDEAU et al references, taken individually or in combination, all of which relate to suspension polymerization, to carry out emulsion polymerization according to the Applicants' present sequence of steps as set forth in claim 37. Thus Applicants maintain that the prior art does not disclose a process that will

lead to or enable one skilled in the art to obtain the presently claimed hybrid silicone composite powder. For this reason alone the hybrid silicone composite powder is patentable over the cited combination of prior art references.

Applicants believe that all claims now presented are in condition for allowance and a response to that effect is earnestly solicited.

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Enclosure:  
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